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Commander receives Hap Arnold award

by Ranney Adams, Propulsion Directorate

LOS ANGELES — Maj. Gen. Paul D. Nielsen, Commander of the Air Force Research Laboratory, was presented the Hap Arnold Award for Excellence in Aeronautic Program Management by the American Institute of Aeronautics and Astronautics (AIAA) at the Los Angeles Convention Center earlier this month.

AFRL Commander Gen. Paul D. Nielsen recently received the AIAA Hap Arnold Award for Excellence. The award was presented by AIAA's past-president and retired Boeing Vice-President John Swiart. (Air Force photo)

The award was presented by AIAA's past-president and retired Boeing Vice-President John Swiart during an awards luncheon that included most of the attendees of AIAA's Aircraft Technology, Integration, and Operations Forum.

Nielsen was honored for his "outstanding contributions to the restructuring of the Milstar satellite program, for an exemplary role as Director of Plans for NORAD, and for visionary leadership of the Air Force Research Laboratory."

Prior to the awards ceremony, Nielsen commented that he was "excited about the recognition for the lab and its military and civilian personnel. This award represents scientists and engineers pulling together. The Milstar program was a huge effort by the Air Force's Space and Missile Systems Center, OSD, Lincoln Lab, Hughes, TRW, and Lockheed. NORAD was special because of the spirit and value of working with all the services and the Canadians to protect our nation. At the Air Force Research Laboratory, I have the privilege of working with a great team of civilian and military people and their counterparts in industry and academia."

AFRL is a full spectrum laboratory dispersed across the United States that is responsible for planning and executing the Air Force's entire science and technology budget – all to keep it the best in the world.

The keynote speech at the awards luncheon was presented by Boeing's George K. Muellner, senior vice president for Air Force Systems – Integrated Defense Systems. The retired Air Force Lt. General and aerospace pioneer spoke about "Emergent Aerospace Concepts."

As the world begins its centennial celebration of manned powered flight, it enters its 2nd century of aviation as a bold new era with leaders like Maj. Gen. Nielsen. @

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Commander
Maj. Gen. Paul D. Nielsen

Director of Public Affairs
Anne Gunter

Production Editor
Jill Bohn

Associate Editor
Katherine Gleason

Public Affairs Specialist
2nd Lt Morgan O'Brien III

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http://extra.afrl.af.mil/news/index.htm

EBS awards contract to Booz Allen & Hamilton

by Katherine Gleason, AFRL Public Affairs

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — The Air Force Research Laboratory's (AFRL) Enterprise Business System (EBS) program office announced Sept. 17 that Booz Allen & Hamilton has been awarded a two-year contract to build the EBS Plan and Program Module with Cross-Cutters.

The agreement, "Plan and Program Module with Cross-Cutters," will be funded at $9,871,815.

Ed Davis, deputy program manager for the EBS program office, noted that the team reviewed several high-quality proposals, consisting of written responses and live presentations/demonstrations, in response to the May solicitation.

The EBS initiative is intended to enable AFRL to comply with one of the lab's core business strategies—the full integration of its wide spectrum of business operations. This, along with improved communications, infrastructure and process, will spearhead transformation of the AFRL enterprise, and facilitate innovative Air Force science and technology planning and decision making.

"With EBS in place, AFRL will benefit from improved decision making, as well as time and cost savings across the entire enterprise," said AFRL Commander Maj. Gen. Paul D. Nielsen. "In the end, that means better support to AFRL's professionals and America's warfighters."

This first EBS initiative will introduce standardized business practices, unparalleled data integrity, and corporate configuration control of AFRL's processes, assets, and technology investments in support of Major Command requirements.

The plan and program module with cross-cutters is intended to be the first in a series of components that will help AFRL plan and perform as a single coordinated organization. While this initial module will focus on the plans and programs business areas and communities of AFRL, future plans include the extension of EBS throughout the laboratory.

The plan and program module with cross-cutters is scheduled for completion in early 2004. **@**

Find additional Fe@tures on the web

PR powers air and space with hypersonic 'scramjet' program

Space and missile technical leader retires

Technology symposium highlights turbine engine successes

SN involved in Millennium Challenge 2002

Hundreds visit AFRL booth at AFA Technology Exhibit

by Larine Barr, AFRL Public Affairs

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — A model of a future long-range strike platform was among several Air Force Research Laboratory initiatives showcased Sept. 16-18 at the Air Force Association's annual Aerospace Technology Exposition.

Held at the Marriott Wardman Park Hotel in Washington, D.C., the colossal event attracted more than 8,000 and showcased the latest technology from across the defense industry.

"This exposition is one of the best venues we have to demonstrate to the defense community the incredible advancements AFRL makes each year in science and technology. It's a great way to reach key people in the industry," said Harry Brown III, AFRL Technology Transfer and Corporate Communications Division, who is a primary organizer of the event for AFRL.

Program managers from all nine AFRL directorates, and the Air Force Office of Scientific Research, demonstrated their newest scientific advancements to a stream of defense contractors, government employees, congressional staff members and international representatives.

Gen. Lester Lyles, commander, Air Force Materiel Command, visited the AFRL Information Directorate booth, featuring command and control technologies during the Air Force Association's Aerospace Technology Exposition in September. (Air Force photo by Harry Brown III)

Surrounded by flat screen monitors and interactive gadgets, visitors to the AFRL display were drawn to such projects as the Propulsion Directorate's Scramjet engine and the Munitions Directorate's low cost autonomous attack system and smart bomb technology.

Engineers from the Information Directorate set up a towering array of command and control technologies, providing onlookers colorful visualizations of futuristic scenarios. Rich Garcia, from the Directed Energy Directorate, gave visitors a mini shock to demonstrate active denial technology, which uses millimeter-wave electromagnetic energy to repel an advancing adversary without causing injury. At the Human Effectiveness Directorate display, experts discussed current research into the possible effects active denial technology may have on the body, and displayed special goggles developed to protect eyes from laser threats.

Representing the Propulsion Directorate, Larry Burns set up a futuristic aircraft platform to demonstrate how the Versatile Affordable Advanced Turbine Engines program might be used some day. The joint Department of Defense, NASA, Department of Energy and industry effort is a multi-year technology effort focused on improving turbine engine affordability and capability. According to Burns, the goal is to fly about 6,000 miles at speeds ranging from Mach 2 to Mach 4 without needing to refuel.

The Air Vehicles Directorate showed browsers how simulation is being used to investigate new technology areas for Unmanned Air Vehicle development. Howard Emsley, one of VA's spokespersons at the booth, explained that programs like the Auto Air Collision Avoidance System and Auto Aerial Refueling use simulation to mature technology, educate the warfighter and reduce risk before flight testing.

Rob Taylor, from the Materials and Manufacturing Directorate, showed attendees samples of ceramic matrix composites developed for use on thermal protection systems, and technical experts from the Space Vehicles Directorate highlighted current space weather research, the TechSat 21 Space Mission and XSS-10 satellite programs.

The Sensors Directorate, Hanscom Air Force Base, set up its notable platinum silicide infrared camera, which has been transitioned to the B-52 bomber fleet. According to directorate representative Jim Murrin, the upgrade has improved the aircraft's navigation, bomb damage assessment and targeting abilities.

Visitors to the AFRL booth also had a chance to fire a satellite thruster, provided by Ranney Adams from the Propulsion Directorate at Edwards Air Force Base, to demonstrate a new Micro Pulsed Plasma Thruster. The lightweight, electronic propulsion concept uses solid Teflon as a fuel source to power small satellites. @

Team AFRL Mesa takes first place in Triathlon

MESA, Ariz. — This year's winner of the Luke Air Force Base Triathlon was the team from AFRL/HEA, Mesa Research Site. The event took place on Sept. 7. Winners from left to right are Ron Lambert (bicycle leg), Dr. Kevin Gluck (swimming leg), and Jay Carroll (running leg). @

Aircraft propulsion celebrates a century of power for flight

by Michael Kelly, Propulsion Directorate

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — One hundred years ago, Orville and Wilbur Wright set out to solve the problem of flight. History has proven their methodical experimentation with kites and gliders evolved into one of mankind's greatest inventions — powered aircraft.

What the Wright's created in 1903 was a reliable propulsion system producing 12 horsepower that provided the thrust necessary for takeoff, climb and sustained level flight.

Today, as the centennial of their first powered flight on Dec. 17, 1903, draws closer, Air Force Research Laboratory scientists, engineers, contractors, engine manufacturers and university researchers continue to expand the envelope of propulsion technologies with their own inventions that push aircraft higher, faster and farther than Orville and Wilbur ever could have imagined.

Celebrating a "Century of Power for Flight," nearly 700 Defense Department, NASA and aerospace industry participants met Sept. 9-12 in the Wright brother's hometown to explore and exploit the latest propulsion technology advances that will preserve America's dominance in the air. The biennial event is sponsored by AFRL's Propulsion Directorate.

WRIGHT-PATTERSON AFB, Ohio — Greg Cone of the Wright Experience turns the prop to start Engine #20 from a 1910 Model B Wright Flyer. The engine is the only operating original Wright engine in the world and was collected and restored in 1999 by Cone. (Air Force photo by Bill McCuddy)

The forum gave the U.S. turbine engine community a chance to review and discuss the latest technology advances achieved through programs like Integrated High Performance Turbine Engine Technology (IHPTET) and Versatile Affordable Advanced Turbine Engines (VAATE).

And just as the Wright Brothers had a clear concept of the role of engines in their aircraft — to provide reliable, sufficient power — their modern day counterparts share that passion.

"We are committed to providing the nation with propulsion and power technologies that will change the future of air, space and weapons," said Col. Al Janiszewski, Propulsion Director.

With more than 450 ongoing programs, 1,000 people and an annual budget of more than $300 million, the Propulsion Directorate provides a complete spectrum of advanced propulsion technologies for the nation's military services, he said.

Besides providing propulsion technologies for aircraft, rockets and spacecraft, the directorate also conducts leading edge research and development in aerospace fuels, propellants and power generating systems.

Mixed in with the symposium's seminars and special presentations on the future of engine durability and warfighter readiness, attendees also got a rare glimpse of their roots with a demonstration of Orville and Wilbur's 1910 Wright Vertical Four aircraft engine, the only operating original Wright engine in the world.

Owned by the Wright Experience, a non-profit charitable organization which seeks to rediscover the Wright Brothers experimentation, discovery and methodology, the 92-year-old engine was collected in 1999 and restored by Greg Cone of Warrenton, Va. Other than minor parts like nuts, bolts and spark plugs, all its parts are original, Cone said.

The "Vertical Four" was the Wright's mature engine design, and was the standard powerplant for their most produced airplane, the Model "B" — the world's first production airplane. Designed by the Wrights and put into production in 1910, it was their most popular aircraft, Cone said.

The engine was started for the first time in 85 years in 2000. Since then, the engine has been demonstrated numerous times, but never to a more appreciative crowd of engine lovers than symposium attendees who share the Wright's vision to explore the engine technologies that power the future of flight.

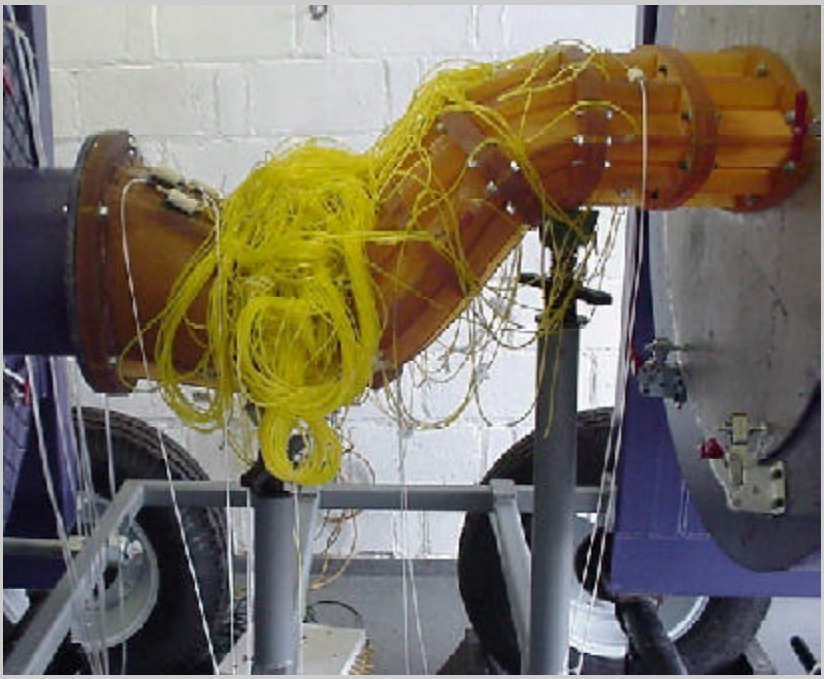
"Staying connected with our tremendous heritage is a very real priority in the engine community," said Col. Janiszewski. "We do this, first, through events like this working demonstration of the Wright brother's engine. But in a much more important way, we do it by sharing the same incredible sense of innovation the Wright brothers displayed by developing revolutionary technologies that make today's Air Force second to none. We honor our past while creating our future." **@**

Air Vehicles completes successful demonstration

by Melissa Kamaka, Air Vehicles Directorate

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — The Air Force Research Laboratory's Air Vehicles Directorate (VA), in cooperation with Techsburg Inc., has demonstrated, for the first time anywhere, closed loop control of pressure distortion in a compact, highly offset serpentine inlet duct.

Realistic flight conditions, such as aircraft maneuvers, constantly change the degree to which serpentine inlets distort the airflow, causing fluctuations in aircraft performance, such as thrust. Thus, a feedback control system is necessary to deliver the appropriate control effort during any given flight condition in order for the air flow to be adjusted accordingly to maintain aircraft performance. Microphones measuring the amplitudes of the pressure fluctuations at the exit plane of the inlet served as the non-intrusive feedback sensors for this study. It was hypothesized that microphones in the vicinity of the distorted flow would record higher amplitudes of pressure fluctuations compared to microphones in the vicinity of the undistorted flow. It was discovered that the difference between the microphone readings in these two flow regimes related to the distortion level; therefore, it served as the feedback signal to the controller.



First Ever Demonstration of Feedback Distortion Control in an Ultra-compact Serpentine Inlet Duct. (Photos courtesy of Lockheed Martin and Techsburg, Inc.)

This approach led to a successful demonstration of the active flow control system that maintained a specified distortion level during a simulated transient flight condition.

Using this technology will allow for smaller, lighter, more cost efficient UAVs and Long Range Strike aircraft, with consistent performance levels as the computer adjusts and corrects for fluctuations in air flow within one second of receiving the feedback via the microphones.

VA performed the demonstration under the Air Force Small Business Innovative Research program using flow control techniques developed with Lockheed Martin Aeronautics and NASA. **@**

Sensor's Directorate co-op uncovers mystery bug

by Grace Janiszewski, Sensors Directorate

Ron Frank

WRIGHT-PATTERSON AIR FORCE BASE, Ohio — The Air Force Research Laboratory's Sensors Directorate co-op Ron Frank, assigned to the Advanced Concepts Exploration (ACE) in-house Global Positioning System (GPS) research team, successfully solved a nagging problem affecting ACE lab performance, which vexed ACE team engineers for over four years.

At issue was a bank of programmable attenuators that caused significant radio frequency (RF) glitches in the Virtual Flight Test (VFT) simulation. Attenuators take RF signals and reduce the power to simulate transmission from the simulated GPS. Several possible hardware fixes were investigated over time, but were found to be far too costly and time consuming to be viable options.

"As folks looked at this problem," said Frank, a senior at Cedarville University, "they analyzed the data in the frequency domain. I decided to examine the wavelengths in the time domain." Instead of tracking the sign waves, he looked at milliseconds. Instead of running the typical data through, he ran DC voltage through the attenuator. It showed that as the internal relay switched, there was a notable pause, which caused the attenuator to spike.

To address the problem, Frank constructed the Programmable Attenuator Control and Test System (PACTS). The PACTS controller uses basic logic and inexpensive integrated circuits, and within three days fashioned the solution.

"The PACTS provided output signals to an attenuator in the same mode and timing that the RF controller, used in the VFT simulation, controls its own attenuators," stated Dana Howell, ACE team manager. "Analysis of the attenuators with PACTS and a digital oscilloscope revealed that the problem was directly related to the switching rate of the internal relays. The software controller for the attenuators was easily modified to accommodate the switching rate and eliminate the glitches."

"It was a very rewarding experience to serve in the Sensors Directorate," Franks aid. "After graduation, I'm hoping to join this exciting team." **@**

Net Index

Due to the number of submissions we receive, some sections of *news@**afrl*** are available exclusively on-line. The on-line version of the newsletter allows users to view the AFRL corporate calendar, news releases generated by AFRL headquarters, operating instructions, L@b L@urels and Roundups sections.

The L@b L@urels section of the electronic newsletter is dedicated to members of Air Force Research Laboratory who receive awards and honors. The Roundups section of the electronic newsletter keeps Air Force Research laboratory employees informed about contracts AFRL has awarded. Below is an index of articles one can find in each of these on-line sections.

L@b L@urels

- **Roquemore named 2002 ASME Fellow**
- **IDEA earns Rome employee $10,000 prize**
- **Bixby receives Tibbetts award for SBIR work**
- **Hap Arnold Award presented to AFRL Commander**

Check out our online version to see the complete listing of Roundups

To view the full text of these and other articles visit the *news@afrl* page on the Internet at http://extra.afrl.af.mil/news/index.htm.
To submit L@b L@urels or Roundups from your directorate, send a query to AFRL Public Affairs at:

Jill.Bohn@afrl.af.mil

For more on these stories see news@afrl http://extra.afrl.af.mil/news/index.htm

MEET AFRL

Cicero devotes time to training solutions

by Steve Gunzburger, Human Effectiveness Directorate

MESA, Ariz. —Glenn Cicero, Threat Systems Engineer, is constantly engaged in delivering training solutions as a key member of the Air Force Research Laboratory's Human Effectiveness Directorate, Warfighter Training Research Division (AFRL/HEA) Mesa Research Site, Ariz.

Industry experts understand Cicero's fervent desire to improve the quality of today's electronic warfare (EW) simulations, and he readily lends his expertise to numerous agencies. He champions a physics-based, synthetic electronic combat environment, which interacts with the natural environment and simulates real-world systems rather than extract information from a table lookup approximation. This ability allows the system to assume human decision-making for coordinated multi-threat actions, and allows interoperability with command and control (C2) functions.

Cicero has several ongoing research and development efforts. His "Next Generation Threat System" is an electronic combat environment that builds threat models on physics-based tactical operations models, hooks into C2 systems, and accounts for appropriate interactions with a natural environment model correlated with the simulation's terrain and visual/sensor model. The advanced sensor simulation is using aircraft code-based radar warning receivers, basic and advanced jamming models, and a physics-based common radar model. Human performance modeling gives decision-making capability to threat and C2 models for standalone functionality of the enhanced training system. The EW simulation environment under development is designed to support required Air Force training and expand the entire spectrum of EW and threat training to meet training needs of the future.

Cicero's extraordinary achievements highlight the special aspect of his crusade to spread the word—that the Air Force Research Laboratory can deliver quality EW training that will enable warfighters to maintain peak readiness for high-threat combat arenas. Accordingly, Cicero continues to lead his small EW team (Robert Feeman and Kyle Tygret of Lockheed Martin Technology Services Group) in breakthrough EW simulation work with laudatory praise from the warfighter. **@**